INLET BAFFLE FOR WATER HEATER

BACKGROUND OF THE INVENTION

This invention relates to liquid heating and storage tanks, and more particularly to a baffle for use in connection with the water inlet for such a heating and storage tank. More particularly, the baffle of the present invention may preferably be used in connection with known water boosters of the type that are used to raise the temperature of water to a desired level for use by a downstream user, generally a commercial warewashing apparatus. The use of the baffle of the present invention with these types of boosters increases the heating efficiency of the booster, thereby lowering energy usage and costs for the user, lowers the time required to heat the water to the desired temperature, and helps to provide water to the downstream user at a consistent temperature.

Warewashing apparatuses, such as conveyor and batch type warewashing or dishwashing machines, generally receive water at a temperature of around 110° from the central hot water supply of most buildings and houses. However, in order to comply with health regulations, warewashing systems that do not utilize a sodium hypochlorite sanitizing system or the like are required to sanitize the ware being washed with a rinse using a minimum of 180° F. water. Furthermore, the use of a 180° F. water rinse is desirable because it facilitates the drying of the ware, thereby decreasing the turnaround time necessary for reuse. This high temperature is generally out of the range available from most buildings and houses central hot water source. Thus, in order to supply water at this desirable temperature, boosters have been employed to raise the temperature of the incoming water from between 110° F. to the required sanitizing temperature of 180° minimum. However, with respect to these booster type heaters, research has shown that a relatively standard water tank having a heater positioned in a center thereof develops stratified temperature gradients within the tank based upon the location of the heater. This research has shown that the water above the heater tends to be hotter than the water below the heater. Accordingly, in order to use the least amount of energy to heat only the water needed to the required temperature at the time it is needed for the next washing cycle, it is desirable to use only this hotter "upper portion" of the water for each rinsing cycle, thereby allowing the cooler "lower portion" of the water to be raised up by the incoming water and heated for the next cycle.

In trying to take advantage of this stratified temperature gradient, though, some problems have arisen. Namely, in prior art systems, the incoming water replacing the outgoing "hotter" rinsing water generally enters the tank in a relatively turbulent, uncontrolled manner. This incoming water disrupts the temperature gradient in the tank thereby detrimentally effecting the temperature consistency of the outgoing water. Therefore, in order to provide heated water at the desired temperature consistently, it would be desirable to control the incoming water in a way in which the disruption of the stratified temperature gradient in the tank is prevented. Preferably, the control of the incoming water can be handled in a manner that is relatively simple and inexpensive, which would not require the use of significant control means, valves, etc., and which would help to provide water at the desired temperature in a relatively efficient manner.

SUMMARY OF THE INVENTION

In accordance with the present invention, a method and apparatus for controlling incoming water flow into a water heating tank is provided. Specifically, the present invention provides a baffle for slowing the incoming water flow into a booster heating tank so that the turbulence in the water tank is minimized. More specifically, a baffle is provided which is of relatively simple construction, which is generally inexpensive to produce, and which may be used in water boosters of the type used in commercial warewashing applications. The baffle is characterized in that it comprises a cap including a water diverting member, such as a flange, which depends downwardly from the edges of the cap. This water diverting member performs the critical task of diverting the water that flows in the inlet backwards (generally downward in a booster having an inlet proximate the bottom of the water holding tank and an outlet substantially proximate the top portion of the water holding tank) away from the outlet and the heating element.

In a preferred embodiment, the baffle of the present invention preferably consists of an inner cap and outer cap which are positioned over the inlet to a water heating tank. The inner cap is preferably provided with openings of varying shapes and sizes that are designed to direct the incoming flow of the water against the underside of the outer cap. The outer cap is positioned over the inner cap and includes a flange that extends around the outer edges thereof. The outer cap is spaced apart from the inner cap such that the incoming water flows through the openings in the inner cap and is directed to the underside of the outer cap. The water, having been sufficiently slowed by the contact with the underside of the outer cap, then flows downward along the outer cap flange and into the main plenum of the tank. The positioning of the flange is such that direct movement of the water from the underside of the cap along the walls of the water tank and out the outlet is prevented thus insuring that the "hotter" water above the heater is removed from the tank first, leaving the "cooler" water to continue to heat in preparation for the next cycle of the warewasher. As will be discussed in greater detail below, use of the baffle of the present invention in the manner herein described has resulted in a better, more consistent temperature gradient in the booster output water temperature, thereby increasing the energy efficiency and utility of the water boosters in which it has been implemented.

In a preferred embodiment, the inner and outer caps could be configured from round or square tubing. A cost effective method is represented herein wherein a flat sheet of metal can be laser cut efficiently and relatively inexpensively. The cut sheet then can simply be formed or folded from the flats.

As stated herein, the principal object of the invention is to provide an improvement in water heating boosters which aids in providing heated water to a downstream user having a relatively consistent temperature gradient, in an efficient manner. It is to be understood that while the specification primarily refers to water as being the substance being re-directed by the baffle of the present invention, the baffle